

REMARKS

The Office Action dated June 8, 2007, has been received and carefully noted. The above amendments and the following remarks are submitted as a full and complete response thereto.

By this Amendment, claim 35 has been amended to correct a minor informality. No new matter is presented. Claims 26-45 are pending and respectfully submitted for consideration.

Rejections Under 35 U.S.C. § 103

Claims 31, 33-34 and 37-40 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Asakawa et al. (U.S. Patent No. 5,795,385, "Asakawa") in view of Zhang et al. (U.S. Patent No. 5,766,344, "Zhang").

Claims 26-30, 35, 36 and 41-45 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Asakawa in view of Zhang and further in view of Selvakumar et al. (U.S. Patent No. 5,633,194, "Selvakumar").

Claim 32 is rejected under 35 U.S.C. § 103(a) as being unpatentable over Asakawa in view of Zhang and further in view of Ahn et al. (U.S. Patent No. 5,470,619, "Ahn").

Asakawa discloses an apparatus for forming a single-crystalline thin film of a prescribed material on a substrate, comprising film forming means for forming an amorphous or a polycrystalline thin film of the prescribed material on the substrate by supplying a reaction gas, irradiation means for irradiating the substrate with gas beams of low energy levels and a substrate rotating means for rotating the substrate.

The apparatus comprises substrate rotating means, whereby it is possible to facilitate formation of an amorphous or polycrystalline thin film by intermittently applying the beams while regularly supplying the reaction gas and rotating the substrate during application pauses. See column 11, line 55 to column 12, line 4 of Asakawa. Asakawa further discloses that the irradiation means preferably comprises an electron cyclotron resonance type ion source, and the gas beams are supplied by the ion source. See column 12, lines 47-49 of Asakawa.

Zhang discloses a method for forming a semiconductor, wherein the processes from the film forming to the laser irradiation may be effected in succession, without a transfer of sample, by using such plasma CVD apparatus as is provided with a high vacuum exhausting device having a window of quartz, etc., so that a laser can be irradiated from the outside, instead of the chamber being exclusively used in the laser annealing.

Selvakumar discloses low temperature ion-beam assisted deposition methods for realizing SiGe/Si heterostructure wherein in-situ cleaning of the substrate surface was done by argon ion bombardment prior to the start of deposition.

With respect to independent claims 33, 34 and 36-40, the Applicants respectfully submit that Asakawa and Zhang do not disclose or suggest the claimed features of the invention.

Each of claims 33, 34 and 36-40 recites, in part, emitting the ion beam to the target surface of the substrate from the ion source in the first direction, and irradiating the pre-film with an energy beam in the first direction while moving the substrate in a

linear second direction crossing the first direction. Asakawa discloses scanning a substrate with respect to two orthogonal directions and a magnetic lens 720 adapted to focus ion current which is downwardly sprayed from an ion source 2 into a form of a strip. See column 59, lines 39-41 of Asakawa. However, with respect to the directional relationship between the ion beam and the energy beam, Asakawa merely discloses “using plasma chemical vapor deposition by supplying a reaction gas onto the substrate and irradiating the substrate with beams of low energy gas causing no sputtering of the beams of a low material from directions which are perpendicular to a plurality of densest crystal planes having different directions in the single-crystalline thin film to be formed.” See column 4, lines 30-67 of Asakawa. Thus, Asakawa does not disclose or suggest that the energy beam is applied in the same first direction as the ion beam.

In addition, Asakawa does not disclose or suggest at least the feature of irradiating the pre-film with the energy beam while moving the substrate in a linear second direction crossing the first direction, as recited in claims 33, 34 and 36-40.

The Applicants respectfully submit that Zhang fails to cure the deficiencies in Asakawa, as Zhang also does not disclose or suggest emitting the ion beam to the target surface of the substrate from the ion source in the first direction, and irradiating the pre-film with an energy beam in the first direction while moving the substrate in a linear second direction crossing the first direction, as recited in claims 33, 34 and 36-40. Thus, Zhang does not disclose or suggest that the energy beam is applied in the same first direction as the ion beam.

Zhang further fails to disclose or suggest at least the feature of irradiating the pre-film with the energy beam while moving the substrate in a linear second direction crossing the first direction, as recited in claims 33, 34 and 36-40.

With respect to independent claims 35 and 36, the Applicants respectfully submit that Selvakumar fails to cure the deficiencies in Asakawa and Zhang and therefore, the combination of Asakawa, Zhang and Selvakumar does not disclose or suggest the claimed features of the invention.

With respect to claims 35 and 36, the Applicants respectfully submit that the combination of Asakawa, Zhang and Selvakumar fails to disclose or suggest the claimed features of the invention. Claims 35 and 36 recite emitting the ion beam to the target surface of the substrate from the ion source in the first direction, and irradiating the pre-film with an energy beam in the first direction while moving the substrate in a linear second direction crossing the first direction. As discussed above, Asakawa and Zhang do not disclose or suggest these features of the invention. Selvakumar fails to cure the deficiencies in Asakawa and Zhang as Selvakumar also does not disclose or suggest the direction of irradiation, direction of the energy beam, or direction of movement of the substrate.

To establish a *prima facie* case of obviousness, each and every feature of a rejected claim must be taught or suggested by the applied art of record. See M.P.E.P. § 2143.03.

In view of the above, the Applicants respectfully submit that Asakawa, Zhang, and Selvakumar, either alone or in combination, fail to support a *prima facie* case of

obviousness for purposes of a rejection of claims 33-40 under 35 U.S.C. § 103. Accordingly, claims 33-40 are not rendered obvious in view of Asakawa, Zhang and Selvakumar, and should be deemed allowable.

Conclusion

The Applicants respectfully submit that claims 33-40 are allowable. Claims 26, 31 and 32 depend from claim 33; claim 41 depends from claim 34; claim 27 depends from claim 35; claims 30 and 42 depend from claim 36; claims 28 and 29 depend from claim 37; claims 43 and 44 depend from claim 38; and claim 45 depends from claim 39.

The Applicants further submit that each of these claims incorporate the patentable aspects thereof, and are therefore allowable for at least the same reasons as discussed above. Accordingly, the Applicants respectfully request withdrawal of the rejections, allowance of claims 26-45 and the prompt issuance of a Notice of Allowability.

Should the Examiner believe anything further is desirable in order to place this application in better condition for allowance, the Examiner is requested to contact the undersigned at the telephone number listed below.

In the event this paper is not considered to be timely filed, the Applicants respectfully petition for an appropriate extension of time. Any fees for such an extension, together with any additional fees that may be due with respect to this paper, may be charged to counsel's Deposit Account No. 01-2300, **referencing Attorney Dkt. No. 107351-00011.**

Respectfully submitted,



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